

WHAT IS CLAIMED IS:

1. A delta-sigma modulator that shifts quantization noise of a digital audio signal to a high-frequency band to
5 reduce noise of the band of the digital audio signal, the delta-sigma modulator comprising:

a quantization bit rate detecting unit configured to detect a quantization bit rate of the digital audio signal;

10 a volume setting value detecting unit configured to detect a volume setting value of the digital audio signal;

a filtering unit configured to have plural sets of filter coefficients having different shaping properties and allow the quantization noise to pass; and

15 a filter coefficient switching unit configured to switch the filter coefficients of the filtering unit in accordance with the detection result of the quantization bit rate detecting unit and the detection result of the volume setting value detecting unit.

20 2. The delta-sigma modulator according to claim 1, wherein:

the filter coefficients include a first coefficient set and a second coefficient set;

25 an order of the first coefficient set is lower than that of the second coefficient set; and

the filter coefficient switching unit switches the filter coefficients to the first coefficient set when the quantization bit rate is equal to or less than a predetermined number.

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3. The delta-sigma modulator according to claim 1, wherein:

the filter coefficients include a first coefficient set and a second coefficient set;

10 an order of the first coefficient set is lower than that of the second coefficient set;

the filter coefficient switching unit switches the filter coefficients to the first coefficient set when the quantization bit rate is equal to or greater than a
15 predetermined number and the volume setting value is equal to or greater than a predetermined value; and

the filter coefficient switching unit switches the filter coefficients to the second filter coefficient set when the quantization bit rate is equal to or greater than
20 the predetermined number and the volume setting value is less than the predetermined value.

4. The delta-sigma modulator according to claim 1, wherein:

the filtering unit includes a memory, which stores the quantization noise; and

when the filter coefficient switching unit switches the filter coefficients, contents of the memory are reset.

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5. The delta-sigma modulator according to claim 1, wherein:

the filtering unit includes a memory, which stores the quantization noise; and

10 when the filter coefficient switching unit switches the filter coefficients so that an order thereof becomes larger, contents of the memory are reset.

15 6. The delta-sigma modulator according to claim 1, wherein:

when the volume setting value is changed and gain rises, the filter coefficient switching unit switches the filter coefficients near the point in time when the rising starts; and

20 when the volume setting value is changed and gain falls, the filter coefficient switching unit switches the filter coefficients near the point in time when the falling ends.

25 7. A method of switching a delta-sigma modulator, the method comprising:

detecting a quantization bit rate of a digital audio signal;

detecting a volume setting value of the digital audio signal; and

5 switching filter coefficients in accordance with the quantization bit rate and the volume setting value.

8. A digital amplifier comprising a delta-sigma modulator that shifts quantization noise of a digital audio
10 signal to a high-frequency band to reduce noise of the band of the digital audio signal, wherein the delta-sigma modulator includes:

 a quantization bit rate detecting unit configured to detect a quantization bit rate of the digital audio signal;

15 a volume setting value detecting unit configured to detect a volume setting value of the digital audio signal;

 a filtering unit configured to have plural sets of filter coefficients having different shaping properties and allow the quantization noise to pass; and

20 a filter coefficient switching unit configured to switch the filter coefficients of the filtering unit in accordance with the detection result of the quantization bit rate detecting unit and the detection result of the volume setting value detecting unit.

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